

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L											
1	UCL Statistics for Data Sets with Non-Detects																						
2																							
3																							
4	User Selected Options																						
5	Date/Time of Computation	ProUCL 5.111/14/2019 3:52:09 PM																					
6	From File	PCB inputs_a.xls																					
7	Full Precision	OFF																					
8	Confidence Coefficient	95%																					
9	Number of Bootstrap Operations	2000																					
10	Aroclor-1016																						
11																							
12																							
13	General Statistics																						
14	Total Number of Observations	522			Number of Distinct Observations																		
15	Number of Detects	0			Number of Missing Observations																		
16	Number of Distinct Detects	0			Number of Non-Detects																		
17																							
18	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!																						
19	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!																						
20	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).																						
21																							
22	The data set for variable Aroclor-1016 was not processed!																						
23																							
24	Aroclor-1221																						
25																							
26																							
27	General Statistics																						
28	Total Number of Observations	525			Number of Distinct Observations																		
29	Number of Detects	0			Number of Missing Observations																		
30	Number of Distinct Detects	0			Number of Non-Detects																		
31																							
32																							
33	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!																						
34	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!																						
35	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).																						
36																							
37	The data set for variable Aroclor-1221 was not processed!																						
38																							
39	Aroclor-1232																						
40																							
41																							
42																							
43	General Statistics																						
44	Total Number of Observations	525			Number of Distinct Observations																		

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L
45					Number of Detects	0					Number of Non-Detects	525
46					Number of Distinct Detects	0					Number of Distinct Non-Detects	134
47	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
48	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
49	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
50												
51												
52	The data set for variable Aroclor-1232 was not processed!											
53												
54												
55	Aroclor-1242											
56												
57	General Statistics											
58												
59												
60												
61												
62												
63	Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!											
64	Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!											
65	The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).											
66												
67	The data set for variable Aroclor-1242 was not processed!											
68												
69												
70	Aroclor-1248											
71												
72	General Statistics											
73												
74												
75												
76												
77												
78	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
79	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
80												
81	The data set for variable Aroclor-1248 was not processed!											
82												
83												
84	Aroclor-1254											
85												
86	General Statistics											
87												
88												

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L		
89					Number of Detects	71				Number of Non-Detects	454			
90					Number of Distinct Detects	59				Number of Distinct Non-Detects	123			
91					Minimum Detect	0.019				Minimum Non-Detect	0.017			
92					Maximum Detect	55				Maximum Non-Detect	45			
93					Variance Detects	119.1				Percent Non-Detects	86.48%			
94					Mean Detects	7.293				SD Detects	10.91			
95					Median Detects	3				CV Detects	1.496			
96					Skewness Detects	2.545				Kurtosis Detects	7.191			
97					Mean of Logged Detects	0.551				SD of Logged Detects	2.192			
98														
99					Normal GOF Test on Detects Only									
100					Shapiro Wilk Test Statistic	0.678				Normal GOF Test on Detected Observations Only				
101					5% Shapiro Wilk P Value	0				Detected Data Not Normal at 5% Significance Level				
102					Lilliefors Test Statistic	0.253				Lilliefors GOF Test				
103					5% Lilliefors Critical Value	0.105				Detected Data Not Normal at 5% Significance Level				
104					Detected Data Not Normal at 5% Significance Level									
105														
106					Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs									
107					KM Mean	1.058				KM Standard Error of Mean	0.209			
108					KM SD	4.715				95% KM (BCA) UCL	1.405			
109					95% KM (t) UCL	1.402				95% KM (Percentile Bootstrap) UCL	1.412			
110					95% KM (z) UCL	1.401				95% KM Bootstrap t UCL	1.521			
111					90% KM Chebyshev UCL	1.684				95% KM Chebyshev UCL	1.967			
112					97.5% KM Chebyshev UCL	2.361				99% KM Chebyshev UCL	3.134			
113														
114					Gamma GOF Tests on Detected Observations Only									
115					A-D Test Statistic	0.582				Anderson-Darling GOF Test				
116					5% A-D Critical Value	0.829				Detected data appear Gamma Distributed at 5% Significance Level				
117					K-S Test Statistic	0.07				Kolmogorov-Smirnov GOF				
118					5% K-S Critical Value	0.113				Detected data appear Gamma Distributed at 5% Significance Level				
119					Detected data appear Gamma Distributed at 5% Significance Level									
120														
121					Gamma Statistics on Detected Data Only									
122					k hat (MLE)	0.45				k star (bias corrected MLE)	0.44			
123					Theta hat (MLE)	16.22				Theta star (bias corrected MLE)	16.57			
124					nu hat (MLE)	63.85				nu star (bias corrected)	62.49			
125					Mean (detects)	7.293								
126														
127					Gamma ROS Statistics using Imputed Non-Detects									
128					GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs									
129					GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)									
130					For such situations, GROS method may yield incorrect values of UCLs and BTVs									
131					This is especially true when the sample size is small.									
132					For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates									

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L		
133					Minimum	0.01					Mean	0.998		
134					Maximum	55					Median	0.01		
135					SD	4.703					CV	4.714		
136					k hat (MLE)	0.191					k star (bias corrected MLE)	0.191		
137					Theta hat (MLE)	5.234					Theta star (bias corrected MLE)	5.229		
138					nu hat (MLE)	200.2					nu star (bias corrected)	200.3		
139					Adjusted Level of Significance (β)	0.0495								
140					Approximate Chi Square Value (200.34, α)	168.6					Adjusted Chi Square Value (200.34, β)	168.5		
141					95% Gamma Approximate UCL (use when n>=50)	1.186					95% Gamma Adjusted UCL (use when n<50)	1.186		
142														
143					Estimates of Gamma Parameters using KM Estimates									
144					Mean (KM)	1.058					SD (KM)	4.715		
145					Variance (KM)	22.23					SE of Mean (KM)	0.209		
146					k hat (KM)	0.0504					k star (KM)	0.0513		
147					nu hat (KM)	52.87					nu star (KM)	53.9		
148					theta hat (KM)	21.01					theta star (KM)	20.61		
149					80% gamma percentile (KM)	0.157					90% gamma percentile (KM)	1.671		
150					95% gamma percentile (KM)	5.68					99% gamma percentile (KM)	22.78		
151														
152					Gamma Kaplan-Meier (KM) Statistics									
153					Approximate Chi Square Value (53.90, α)	38.04					Adjusted Chi Square Value (53.90, β)	38		
154					95% Gamma Approximate KM-UCL (use when n>=50)	1.5					95% Gamma Adjusted KM-UCL (use when n<50)	1.501		
155														
156					Lognormal GOF Test on Detected Observations Only									
157					Shapiro Wilk Approximate Test Statistic	0.914					Shapiro Wilk GOF Test			
158					5% Shapiro Wilk P Value	4.6483E-5					Detected Data Not Lognormal at 5% Significance Level			
159					Lilliefors Test Statistic	0.128					Lilliefors GOF Test			
160					5% Lilliefors Critical Value	0.105					Detected Data Not Lognormal at 5% Significance Level			
161					Detected Data Not Lognormal at 5% Significance Level									
162														
163					Lognormal ROS Statistics Using Imputed Non-Detects									
164					Mean in Original Scale	1.004					Mean in Log Scale	-5		
165					SD in Original Scale	4.701					SD in Log Scale	3.16		
166					95% t UCL (assumes normality of ROS data)	1.342					95% Percentile Bootstrap UCL	1.352		
167					95% BCA Bootstrap UCL	1.402					95% Bootstrap t UCL	1.476		
168					95% H-UCL (Log ROS)	1.821								
169														
170					Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution									
171					KM Mean (logged)	-3.167					KM Geo Mean	0.0421		
172					KM SD (logged)	1.851					95% Critical H Value (KM-Log)	2.918		
173					KM Standard Error of Mean (logged)	0.0998					95% H-UCL (KM -Log)	0.296		
174					KM SD (logged)	1.851					95% Critical H Value (KM-Log)	2.918		
175					KM Standard Error of Mean (logged)	0.0998								
176														

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L								
177																				
178																				
DL/2 Statistics																				
179						DL/2 Log-Transformed														
180				Mean in Original Scale		1.972	Mean in Log Scale													
181				SD in Original Scale		4.961	SD in Log Scale													
182				95% t UCL (Assumes normality)		2.329	95% H-Stat UCL													
183																				
184																				
185																				
186																				
187																				
188																				
189																				
190																				
191																				
192																				
193																				
194																				
195 Aroclor-1260																				
196																				
197																				
General Statistics																				
198																				
199																				
200																				
201																				
202																				
203																				
204																				
205																				
206																				
207																				
208																				
209																				
210 Normal GOF Test on Detects Only																				
211																				
212																				
213																				
214																				
215 Detected Data Not Normal at 5% Significance Level																				
216																				
217 Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs																				
218																				
219																				
220																				

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility

	A	B	C	D	E	F	G	H	I	J	K	L
221				90% KM Chebyshev UCL		13.24				95% KM Chebyshev UCL		14.17
222				97.5% KM Chebyshev UCL		15.47				99% KM Chebyshev UCL		18.01
223	Gamma GOF Tests on Detected Observations Only											
224												
225	A-D Test Statistic Anderson-Darling GOF Test											
226	5% A-D Critical Value Detected data appear Gamma Distributed at 5% Significance Level											
227	K-S Test Statistic Kolmogorov-Smirnov GOF											
228	5% K-S Critical Value Detected data appear Gamma Distributed at 5% Significance Level											
229	Detected data appear Gamma Distributed at 5% Significance Level											
230												
231	Gamma Statistics on Detected Data Only											
232												
233	k hat (MLE)	0.578					k star (bias corrected MLE)				0.576	
234	Theta hat (MLE)	22.23					Theta star (bias corrected MLE)				22.32	
235	nu hat (MLE)	530.9					nu star (bias corrected)				528.8	
236	Mean (detects)	12.85										
237	Gamma ROS Statistics using Imputed Non-Detects											
238	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
239	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
240	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
241	This is especially true when the sample size is small.											
242	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
243	Minimum	0.01								Mean	11.18	
244	Maximum	91								Median	4.45	
245	SD	15.78								CV	1.412	
246	k hat (MLE)	0.383					k star (bias corrected MLE)				0.382	
247	Theta hat (MLE)	29.17					Theta star (bias corrected MLE)				29.24	
248	nu hat (MLE)	404.6					nu star (bias corrected)				403.6	
249	Adjusted Level of Significance (β)	0.0495										
250	Approximate Chi Square Value (403.64, α)	358.1					Adjusted Chi Square Value (403.64, β)				358	
251	95% Gamma Approximate UCL (use when n>=50)	12.6					95% Gamma Adjusted UCL (use when n<50)				12.6	
252												
253	Estimates of Gamma Parameters using KM Estimates											
254	Mean (KM)	11.18					SD (KM)				15.76	
255	Variance (KM)	248.4					SE of Mean (KM)				0.687	
256	k hat (KM)	0.503					k star (KM)				0.501	
257	nu hat (KM)	531.3					nu star (KM)				529.6	
258	theta hat (KM)	22.22					theta star (KM)				22.29	
259	80% gamma percentile (KM)	18.36					90% gamma percentile (KM)				30.22	
260	95% gamma percentile (KM)	42.9					99% gamma percentile (KM)				74.05	
261												
262	Gamma Kaplan-Meier (KM) Statistics											
263	Approximate Chi Square Value (529.58, α)	477.2					Adjusted Chi Square Value (529.58, β)				477.1	
264	95% Gamma Approximate KM-UCL (use when n>=50)	12.41					95% Gamma Adjusted KM-UCL (use when n<50)				12.41	

ProUCL Output for Post-Remediation PCBs in Surface Soil (0 - 2 ft.)
Standard Outdoor Worker
Amtrak - Wilmington Maintenance Facility